

**REMARKS**

Claims 13 to 16 and 18 to 24 are pending in this patent application.

The Action includes rejections under 35 U.S.C. § 103. In view of the following remarks reconsideration and withdrawal of the rejections are respectfully requested.

**Discussion of the Rejections Under 35 U.S.C. § 103(a)**

Claims 13, 14, 15, 18, 19, 21, and 22 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 6,063,306 to Kaufman et al. ("Kaufman") in view of U.S. patent application Publication No. 2003/0064671 to Pasqualoni et al. ("Pasqualoni"). Claims 16 and 20 also stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Kaufman in view of Pasqualoni and further in view of U.S. Patent No. 5,750,440 to Vanell et al. ("Vanell"). Applicants respectfully traverse these rejections as one of ordinary skill in the art presented with Kaufman, Pasqualoni, and Vanell, at the time of the present invention would not have been motivated to combine their teachings in such a way that would produce Applicants' claimed invention.

The claimed invention is directed to a chemical mechanical polishing (CMP) mixture comprising, in relevant part, a plurality of particles having an average particle diameter ranging from **500 to 2000  $\mu\text{m}$** . Applicants have found that CMP mixtures with large, preferably non-abrasive, particles advantageously remove excess copper material from a semiconductor substrate without causing defects such as dishing or scratches in the underlying dielectric layer.

*Kaufman and Pasqualoni*

Kaufman is directed to a CMP polishing slurry that utilizes a combination of an abrasive, oxidizing agent, complexing agent, and organic amino group to selectively polish the copper portion of a copper containing substrate. The Action admits that Kaufman fails to disclose the claimed particle diameter (Action at 3). To remedy this deficiency, the Action combines the

teachings of Kaufman with Pasqualoni. Significantly, however, Pasqualoni **teaches away** from such combination because Pasqualoni teaches that particles of the size recited in Applicants' claimed invention are filtered and, thus, **removed** from the slurry composition.

Pasqualoni teaches a CMP slurry composition wherein the number of particles greater than 0.5  $\mu\text{m}$  is **reduced** by filtering the slurry (Pasqualoni at ¶ [0013]). According to Pasqualoni, "by reducing the number of abrasive large particles ... in a CMP slurry composition, deflectivity and oxide thinning/total copper loss on the substrate being polished is significantly reduced and/or eliminated" (*Id.* at ¶ [0015]).<sup>1</sup> To reduce the number of large particles in the slurry, Pasqualoni suggests filtering the slurry with a series of filters starting with coarse filters (*i.e.*, 50  $\mu\text{m}$ ) followed by fine pore size filters (*i.e.*, 0.5  $\mu\text{m}$ ) (*Id.* at ¶¶ [0020] to [0021]). Indeed, particles of the 500 to 2000  $\mu\text{m}$  size, *i.e.*, the size recited by Applicants' claims, are removed by such filtration techniques. Thus, Pasqualoni expressly **teaches away** from Applicants' claimed invention. Accordingly, one of ordinary skill in the art at the time of the present invention would not have been motivated to combine Kaufman with Pasqualoni as proposed by the Action.

*Kaufman, Pasqualoni, and Vanell*

Rejected Claims 16 and 20 are dependent from independent Claims 13 and 19, respectively. Since, as discussed above, the combination of Kaufman and Pasqualoni does not teach or suggest the basic invention, even if Vanell discloses the additional limitation of Applicant's dependent Claims 16 and 20 (*arguendo*), its combination with Kaufman and Pasqualoni still would not render obvious the claimed invention. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

---

<sup>1</sup> It is noted that in contrast to Applicants' description of "large" particles (*i.e.*, particles sized from 500 to 2000  $\mu\text{m}$ ), Pasqualoni defines "large" particles as those having an average diameter size greater than about 0.5  $\mu\text{m}$  (*i.e.*, 1000 times smaller than Applicants' "large" particles).

**Conclusion**

Applicants believe that the foregoing constitutes a complete and full response to the Action of record. Applicants respectfully submit that this application is now in condition for allowance. Accordingly, an indication of allowability and an early Notice of Allowance are respectfully requested.

The Commissioner is hereby authorized to charge the fee required and any additional fees that may be needed to Deposit Account No. 01-0493 in the name of Air Products and Chemicals, Inc.

Respectfully submitted,

/Joseph D. Rossi/

Joseph D. Rossi  
Registration No. 47,038  
7201 Hamilton Boulevard  
Allentown, PA 18195-1501  
(610) 481-8169